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(56) Documents Cited
EP 0574270 A2 US 5372326 A US 5292086 A
US 4494712 A US 3888432 A

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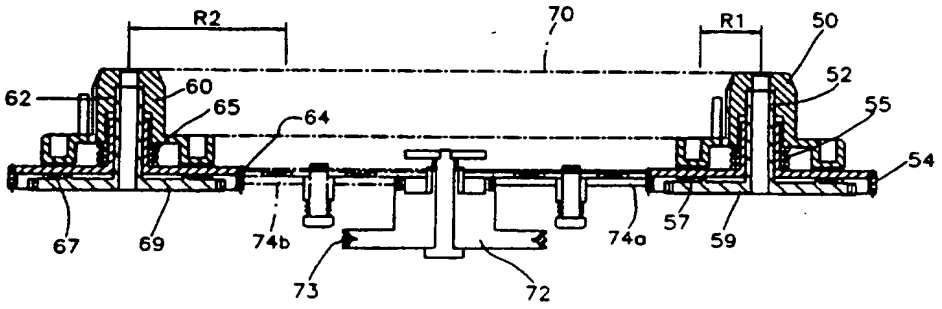
(54) Reel driving device for VCR

(57) A take-up reel 50 is driven by a reel gear 54 through symmetrically arranged frictional felts 57. The felts 57 act between the reel gear 54 and a reel base 59 having a shaft 52 interference-fitted to the reel 50. A coil spring 55 urges the reel base 59 and reel gear 54 together, but as the weight of tape on the reel 50 increases the effect of the spring is countered to allow slippage between the reel gear 54 and reel base 59. Thus the travelling speed of the tape is kept constant despite the growing radius of the tape coil on the reel 50. The supply reel assembly 60-69 has a similar construction, and drive is switched between the reels by moving an idler gear between positions 74a and 74b.

FIG.2



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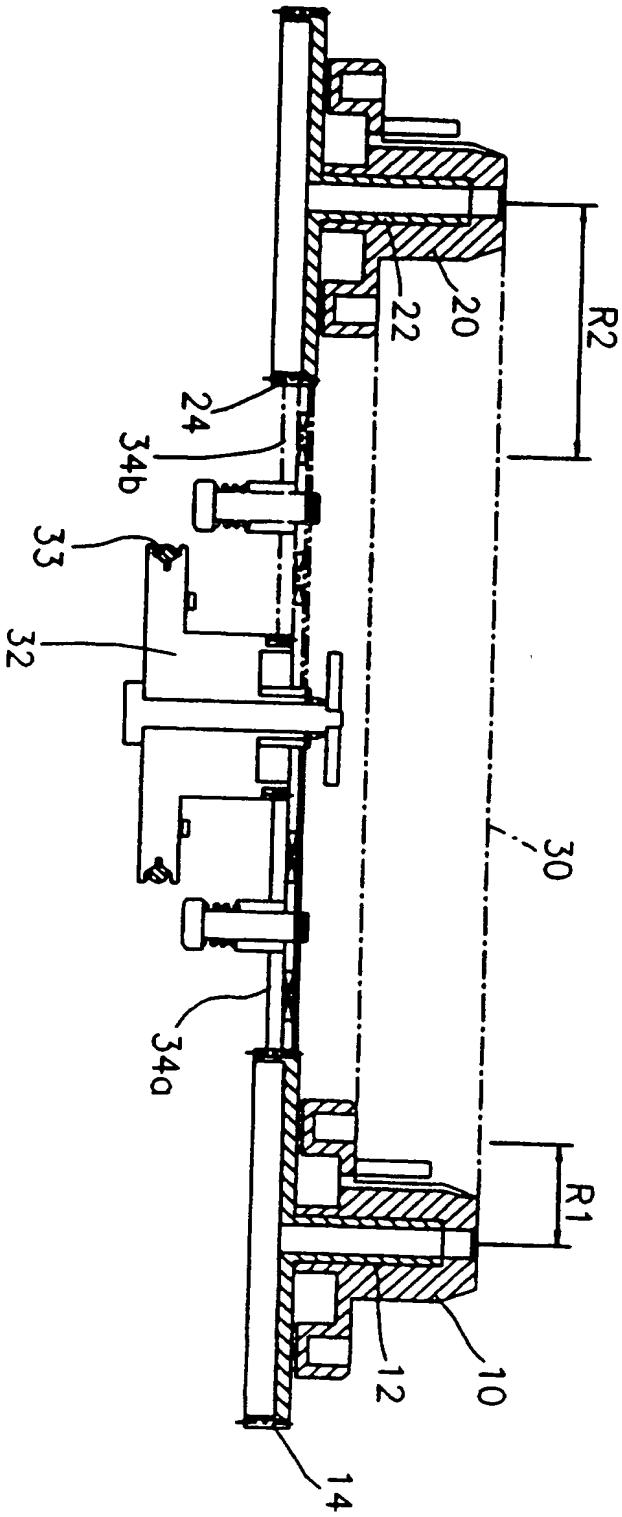

FIG.1
PRIOR ART

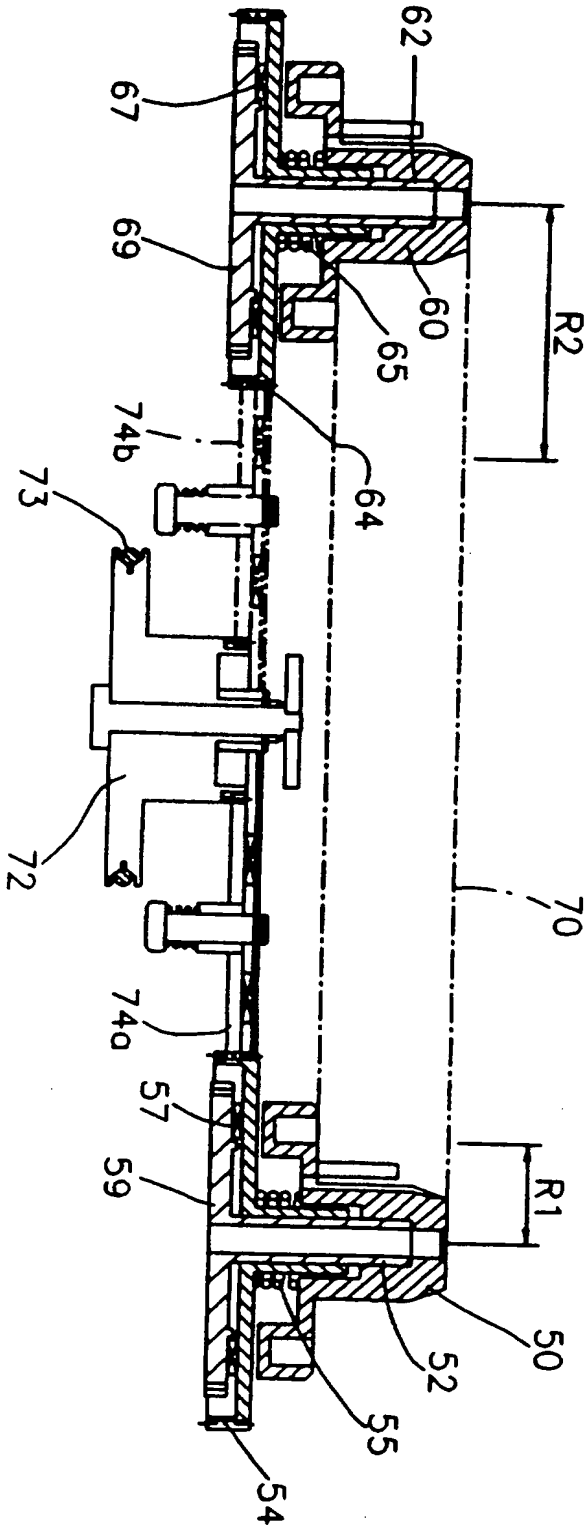

FIG.2

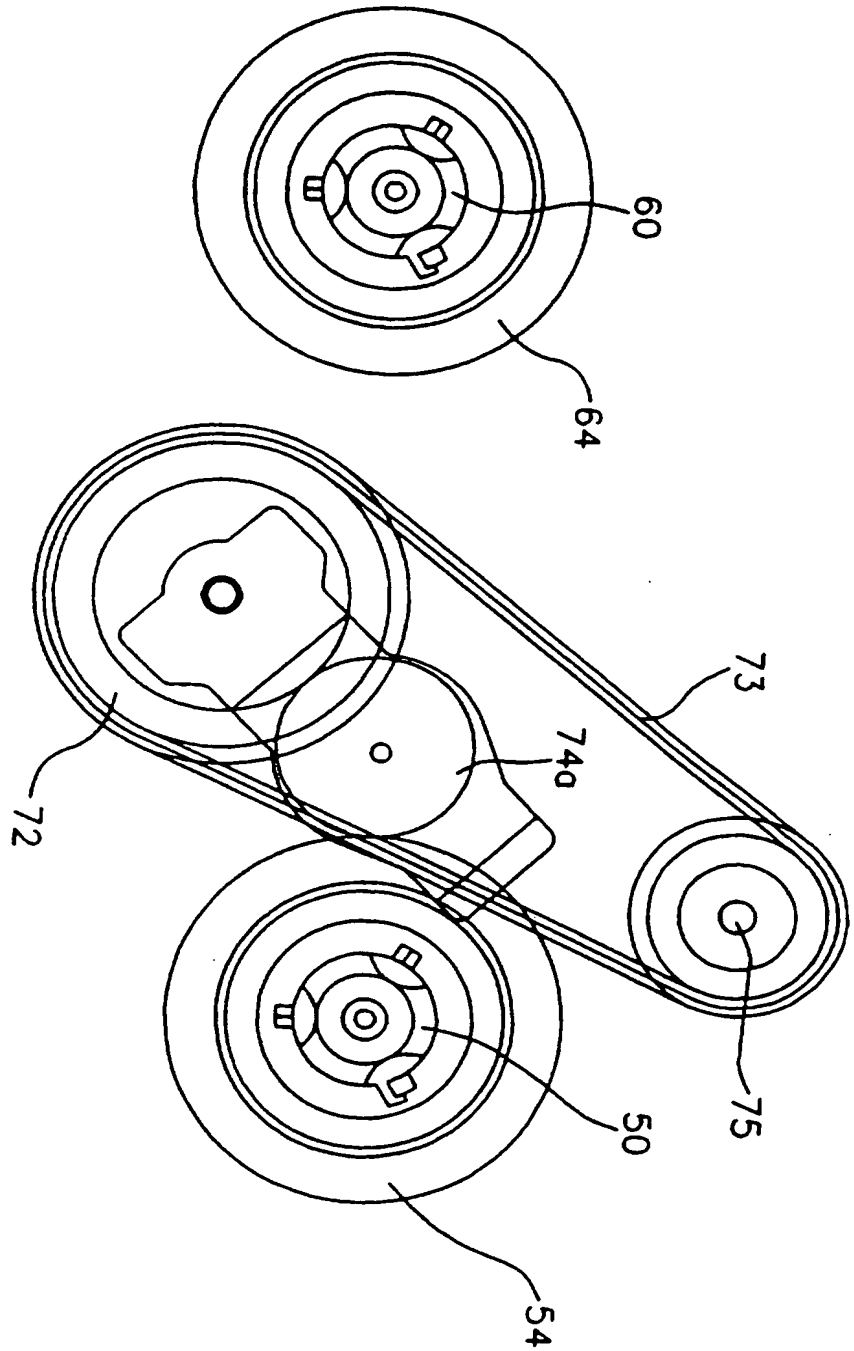

FIG.3

REEL DRIVING DEVICE FOR VCR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a reel driving device for winding a tape of a video cassette recorder (VCR), and more particularly to a reel driving device for a VCR for constantly maintaining a travelling speed of a tape by controlling a rotative speed of a reel in accordance with a quantity of coiling a tape.

2. Description of the Prior Art

A diagrammatic sectional view with respect to a conventional reel driving device for a VCR is illustrated in FIG. 1. As shown in FIG. 1, the conventional reel driving device is formed by a take-up reel 10 on which a tape 30 is wound, a supply reel 20 for supplying tape 30, and an idle gear 34 for selectively swinging between reels 10 and 20, and a driving gear 32.

Take-up reel 10 is interferance-fitted with a rotating shaft 12 of a reel gear 14 in the rotational center thereof. Reel gear 14 is formed with rotating shaft 12 in a body at the center thereof and gears along the outer periphery thereof. A reference numeral R1 denotes a rolling radius of tape 30 winding around take-up reel 10.

Supply reel 20 is interferance-fitted with a rotating shaft 22 of a reel gear 24 in the rotational center thereof. Reel gear 24 is formed with rotating shaft 22 in a body at the

center thereof and gears along the outer periphery thereof. A reference numeral R2 denotes a rolling radius of tape 30 wound by supply reel 20.

Driving gear 32 is driven by a belt 33 connected to a motor (not shown) and a pulley (not shown). Idle gear 34 is partially brought into meshing engagement with driving gear 32, and is partially brought into meshing engagement with reel gear 14 or 24. Solid-lined idle gear 34a indicates a state of being brought into meshing engagement with reel gear 14 of take-up reel 10. Dotted idle gear 34b is of being brought into meshing engagement with reel gear 24 of supply reel 20.

The reel driving device for the VCR having the above-described construction is operated as follows.

Belt 33 transmits a torque of the motor to driving gear 32. In the event of the VCR is in a play mode or FF mode, idle gear 34 is in mesh with driving gear 32 and reel gear 14 of take-up reel 10 between them. Accordingly, the torque of driving gear 32 is transmitted to reel gear 14 via idle gear 34a. The rotation of reel gear 14 is directly transferred to take-up reel 10 via rotating shaft 12. Thus, take-up reel 10 is rolled up by tape 30 while being rotated. At this time, supply reel 20 is freely rotated since it is not in mesh with idle gear 34a.

If the VCR is in a rewind mode, idle gear 34 is in mesh with driving gear 32 and reel gear 24 of supply reel 20 to be sandwiched between them. Therefore, the torque of driving gear 32 is transmitted to reel gear 24 via idle gear 34b. The

rotation of reel gear 24 is directly transferred to supply reel 20 via rotating shaft 22. Consequently, supply reel 20 is rotated to wind with tape 30. At this time, take-up reel 10 is freely rotated since it is not in mesh with idle gear 34b.

The reel driving device of the conventional VCR constructed as above has the following drawbacks. Since the take-up reel (or supply reel) is fixed to the reel gear, the rotative speed of the take-up reel (or supply reel) becomes the same as the reel gear. However, rolling radius R1 of the tape winding around the take-up reel is gradually increased as the play operation of the tape further proceeds. Consequently, if the rotative speed of the take-up reel is constant, the travelling distance of the tape is changed while the take-up reel is rotated once because rolling radius R1 is increased. This becomes a cause of impelling the play condition to be unstable, thereby deleteriously degrading picture quality.

On the contrary, when the tape is rewound from the take-up reel to the supply reel, rolling radius R2 is increased due to the constant rotative speed of the supply reel to be disadvantageous in that the coiling of the tape is inconsistent.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide a reel driving device for a VCR, wherein, in order to solve the foregoing problems of the conventional technique, a rotative speed of a take-up reel is regulated in accordance

with a quantity of coiling a tape when the tape is wound around the take-up reel from a supply reel to lead a travelling speed of the tape to be constant.

It is another object of the present invention to provide a reel driving device for a VCR for regulating a rotative speed of a supply reel in accordance with a quantity of coiling a tape when the tape is rewound around the supply reel from a take-up reel to make the rolling condition of the tape consistent.

To achieve the above object of the present invention, there is provided a reel driving device for a VCR including a reel gear for receiving a torque from a driving motor. Also, a feed member has a take-up reel wound by a tape by maintaining a predetermined distance from an upper plane of the reel gear, and a reel base piercing through the reel gear to be formed in a body while maintaining a predetermined distance from a lower plane of the reel gear. An elastic unit is installed between the upper plane and take-up reel for supporting the feed member. Additionally, a friction member is installed between the lower plane and reel base for producing a rotative frictional force.

Preferably, the reel gear receives the torque from the driving motor via an idle gear.

It is preferable that the reel base has a rotating shaft which is interferance-fitted into the take-up reel by penetrating through the reel gear, and the rotating shaft penetrates through the center of the reel gear. More

preferably, the rotating shaft is rotatable with respect to the reel gear.

The elastic unit may be a compressive coil spring which is preferably deformed up and down in accordance with a coiling weight of the tape.

Preferably, the friction member is at least one felt which is fixed onto the reel base. More preferably, the felts are arranged to be symmetrical to each other on the reel base.

Alternatively, the above object of the present invention is achieved by a reel driving device for a VCR including a reel gear for receiving a torque from a driving motor via an idle gear. Also, a feed member has a take-up reel wound with a tape by maintaining a predetermined distance from an upper plane of the reel gear, and a rotating shaft interferance-fitted into the take-up reel by penetrating through the center of the reel gear to be rotatable with respect to the reel gear and integrally installed onto a reel base which maintains a predetermining distance from a lower plane of the reel gear. In addition, a compressive coil spring is installed between the upper plane and take-up reel for supporting the feed member, and deformed up and down in accordance with a coiling weight of the tape, and felts are fixed onto the reel base to be symmetrical to each other between the lower plane and reel base for producing a rotative frictional force.

Still alternatively, there is provided a reel driving device for a VCR including a take-up reel assembly which has a first reel gear for receiving a torque from a driving motor,

a first feed member formed by a take-up reel wound with a tape by maintaining a predetermined distance from an upper plane of the first reel gear and a first reel base maintaining a predetermined distance from a lower plane of the first reel gear by being integrally formed with the first reel gear while piercing therethrough, first elastic means installed between the upper plane and take-up reel for supporting the first feed member, and a first friction member installed between the lower plane and first reel base for producing a rotative frictional force. Also, a supply reel assembly for supplying the tape to the take-up reel assembly has a second reel gear for receiving the torque from the driving motor, a second feed member formed by a supply reel wound with the tape by maintaining a predetermined distance from an upper plane of the second reel gear and a second reel base maintaining a predetermined distance from a lower plane of the second reel gear by being integrally formed with the second reel gear while piercing therethrough, second elastic means installed between the upper plane and supply reel for supporting the second feed member, and a second friction member installed between the lower plane and second reel base for producing a rotative frictional force.

Here, it is preferable that the first reel gear and second reel gear further includes an idle gear selectively swings between the first reel gear and second reel gear to be brought into meshing engagement with either one of the first and second reel gears.

Hence, the operation of the reel driving device for the

VCR according to the present invention as described above in a play mode is carried out as below. The idle gear is brought into meshing engagement between the driving gear and reel gear of the take-up reel. Thus, the torque of the driving gear is transmitted to the reel gear via the idle gear. The rotation of the reel gear is transferred to the reel base via the felts. The torque of the reel base is delivered to the take-up reel via the rotating shaft.

When the tape rolling radius of the take-up reel is increased, the take-up reel constricts the spring by the weight of the tape. Since the take-up reel descends while constricting the spring, the reel base also descends in the same way. Thus, the interval between the reel gear and reel base is enlarged. Due to this fact, the rotative frictional force applied by the felts upon the lower plane of the reel gear is decreased. The decrease of the frictional force incites sliding motion between reel gear and reel base. By this sliding motion, the rotative speed of the reel base becomes slower than that of the reel gear. That is, as the rolling radius is increased, the sliding motion is greatly effected further, so that the take-up reel is rotated slowly. Consequently, the tape travels at the constant speed.

When the tape is rewound, the supply reel is operated as the take-up reel in the same manner.

Therefore, the reel driving device for the VCR according to the present invention described as above is effective in that the travelling speed of the tape is constantly maintained

while the rolling condition of the tape is consistent when rewinding the tape.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and other advantages of the present invention will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

FIG. 1 is a diagrammatic section view showing a reel driving device for a conventional VCR;

FIG. 2 is a diagrammatic section view showing a reel driving device for a VCR according to the present invention; and

FIG. 3 is a diagrammatic plan view showing the reel driving device for the VCR shown in FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A reel driving device for a VCR according to the present invention will be described in detail with reference to FIGS. 2 and 3.

FIG. 2 is a diagrammatic section view of the reel driving device for the VCR according to the present invention. In FIG. 2, a solid-lined idle gear 74a is in the state of being in mesh with a driving gear 72 and a reel gear 54 to be sandwiched between them. Also, a dotted idle gear 74b is in mesh with driving gear 72 and a reel gear 64 to be sandwiched between them. A radius R1 designates a rolling radius of a tape 70

winding on take-up reel 50, and a radius R2 is a rolling radius of tape 70 winding around supply reel 60.

Driving gear 72 is rotated by a belt 73 connected to a motor (not shown). Driving gear 72 is formed with gears along the upper portion thereof to be brought into meshing engagement with idle gear 74.

Idle gear 74 is brought into meshing engagement with reel gear 54 in a play mode of the VCR and with reel gear 64 in a rewind mode.

Reel gear 54 has a tooth form along the circumferential plane, and a rotating shaft 52 pierces through the rotational center of reel gear 54 to be freely rotated therein. The rotation of reel gear 54 is confined by idle gear 74a, but up and down feeding thereof is not allowable.

A reel base 59 maintains an interval that varies against the lower plane of reel gear 54. A pair of felts 57 are arranged to the upper plane of reel base 59, which are closely attached to the lower plane of reel gear 54 to produce a frictional force. Rotating shaft 52 is formed at the rotating center of reel base 59 in a body.

Take-up reel 50 is interferance-fitted with the upper end of rotating shaft 52 to be rotated with reel base 59 altogether. Take-up reel 50, rotating shaft 52 and reel base 59 constitute an integrally-operated feed member.

A coil spring 55 is disposed to the lower plane of take-up reel 50 and the upper plane of reel gear 54. Rotating shaft 52 penetrates through the center of coil spring 55 which is

elastically deformed up and down in accordance with the weight of tape 70 which winds around take-up reel 50.

Supply reel 50, reel gear 64, spring 65, reel base 69, rotating shaft 62 and reel gear 64 have the same structure as corresponding take-up reel 50, reel gear 54, spring 55, reel base 59, rotating shaft 62 and reel gear 54.

FIG. 3 is a diagrammatic plan view showing the reel driving device for the VCR shown in FIG. 2. Referring to FIG. 3, it is constructed such that supply reel 60 and take-up reel 50 are spaced apart from each other by a predetermined distance, and idle gear 74 selectively swings between them.

Belt 73 is connected between driving motor 75 and driving gear 72. Idle gear 74 in mesh with driving gear 72 is brought into meshing engagement with reel gear 54 or 64 in accordance with the operational mode of the VCR.

The reel driving device for the VCR according to the present invention having the above-described construction is operated and effective as below.

Belt 73 delivers the torque of motor 75 to driving gear 72. In the event that the VCR is in the play mode or FF mode, idle gear 74 is brought into meshing engagement with driving gear 72 and reel gear 54 of take-up reel 50. Thus, the torque of driving gear 72 is transmitted to reel gear 54 via idle gear 74a. The torque of reel gear 54 is transferred to reel base 59 by the frictional force of felts 57. The torque of reel base 59 is transmitted to take-up reel 50 via rotating shaft 52 to force tape 70 to travel. At this time, supply reel 60 becomes

freely rotated since it is not in mesh with idle gear 74a.

If tape rolling radius R1 of take-up reel 50 is small, the weight of tape 70 winding on take-up reel 50 is small as much. Due to the weight of tape 70, the elastic force of coil spring 55 which supports take-up reel 50 becomes greater than the force of take-up reel 50 directing to descend. Consequently, the interval between take-up reel 50 and the upper plane of reel gear 54 is enlarged. At this time, since reel base 59 ascends together with take-up reel 50, the interval between the lower plane of reel gear 54 and reel base 59 is reduced. Therefore, the frictional force between reel gear 54 and felts 57 is increased. For this reason, reel base 59 does not involve rotative sliding motion but is rotated at high speed identical to that of reel gear 54. In other words, since take-up reel 50 is rotated at the same speed as reel base 59 even though rolling radius R1 is small, the travelling speed of tape 70 is constant.

When tape rolling radius R1 of take-up reel 50 is increased, take-up reel 50 constricts spring 55 owing to the weight of tape 70. Take-up reel 50 descends while constricting spring 55, so that reel base 59 descends in the same manner. Thus, reel gear 54 becomes distanced from reel base 59. By doing so, the rotative frictional force of felts 57 imposing upon the lower plane of reel gear 54 is decreased. The decrease of the frictional force incites the sliding motion between reel gear 54 and reel base 59. The sliding motion makes the rotative speed of reel base 59 slower than that of reel gear 54. That

is, as rolling radius R1 is increased, the sliding motion is greatly effected further to rotate take-up reel 50 slowly. As the result, tape 70 travels at the constant speed.

When the VCR is in the rewind mode, idle gear 74b is brought into meshing engagement with driving gear 72 and reel gear 64 of supply reel 60 sandwiched between them. Thus, the torque of driving gear 62 is transmitted to reel gear 64 via idle gear 74b. At this time, take-up reel 50 is freely rotated since it is not in mesh with idle gear 74b.

The sequential order of delivering the torque of supply reel 60 is the same as of take-up reel 50. Also, the operation of increasing the rotative speed of supply reel 60 when rolling radius R2 of supply reel 60 is small and the operation of decreasing the rotative speed of supply reel 60 when rolling radius R2 is large are the same as of take-up reel 50.

As a result, the reel driving device for the VCR according to the present invention can constantly maintain the travelling speed of the tape regardless of the quantity of coiling the tape in the play mode to be effective in securing clear picture quality. In addition, the tape is consistently wound in the rewind mode to prevent damage upon the tape and thereby expand durability of the tape.

While the present invention has been particularly shown and described with reference to particular embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be effected therein without departing from the spirit and scope of the invention as defined

by the appended claims.

WHAT IS CLAIMED IS:

1. A reel driving device for VCR comprising:

a reel gear for receiving a torque from a driving motor;

a feed member having a take-up reel on which a tape is wound by maintaining a predetermined distance from an upper plane of said reel gear, and a reel base piercing through said reel gear to be formed in a body while maintaining a predetermined distance from a lower plane of said reel gear;

elastic means installed between said upper plane and take-up reel for supporting said feed member; and

a friction member installed between said lower plane and reel base for producing a rotative frictional force.

2. The reel driving device for VCR as claimed in claim 1, wherein said reel gear receives said torque from said driving motor via an idle gear.

3. The reel driving device for VCR as claimed in claim 1, wherein said reel base has a rotating shaft interferance-fitting into said take-up reel by penetrating through said reel gear.

4. The reel driving device for VCR as claimed in claim 3, wherein said rotating shaft penetrates through the center of said reel gear.

5. The reel driving device for VCR as claimed in claim 4, wherein said rotating shaft is rotatable with respect to said reel gear.

6. The reel driving device for VCR as claimed in claim 1, wherein said elastic means is comprised of a compressive coil

spring.

7. The reel driving device for VCR as claimed in claim 6, wherein said coil spring is deformed up and down in accordance with a coiling weight of said tape.

8. The reel driving device for VCR as claimed in claim 1, wherein said friction member is comprised of at least one felt.

9. The reel driving device for VCR as claimed in claim 8, wherein said felts are fixed onto said reel base.

10. The reel driving device for VCR as claimed in claim 9, wherein said felts are arranged to be symmetrical to each other on said reel base.

11. A reel driving device for VCR comprising:

a reel gear for receiving a torque from a driving motor via an idle gear;

a feed member having a take-up reel on which a tape is wound by maintaining a predetermined distance from an upper plane of said reel gear, and a rotating shaft interferance-fitted into said take-up reel by penetrating through the center of said reel gear to be rotatable with respect to said reel gear and integrally installed onto a reel base which maintains a predetermining distance from a lower plane of said reel gear;

a compressive coil spring installed between said upper plane and take-up reel for supporting said feed member, and deformed up and down in accordance with a coiling weight of said tape; and

felts fixed onto said reel base to be symmetrical to each other between said lower plane and reel base for producing a

rotative frictional force.

12. A reel driving device for VCR comprising:

a take-up reel assembly which has a first reel gear for receiving a torque from a driving motor, a first feed member formed by a take-up reel wound with a tape by maintaining a predetermined distance from an upper plane of said first reel gear and a first reel base maintaining a predetermined distance from a lower plane of said first reel gear by being integrally formed with said first reel gear while piercing therethrough, first elastic means installed between said upper plane and take-up reel for supporting said first feed member, and a first friction member installed between said lower plane and first reel base for producing a rotative frictional force; and

a supply reel assembly for supplying said tape to said take-up reel assembly, which has a second reel gear for receiving the torque from said driving motor, a second feed member formed by a supply reel wound with said tape by maintaining a predetermined distance from an upper plane of said second reel gear and a second reel base maintaining a predetermined distance from a lower plane of said second reel gear by being integrally formed with said second reel gear while piercing therethrough, second elastic means installed between said upper plane and supply reel for supporting said second feed member, and a second friction member installed between said lower plane and second reel base for producing a rotative frictional force.

13. The reel driving device for VCR as claimed in claim

12, wherein said first reel gear and second reel gear further comprises an idle gear selectively swings between said first reel gear and second reel gear to be brought into meshing engagement with either one of said first and second reel gears.

The Patent Office

Application No:	GB 9624888.5	**Examiner:**	Donal Grace
Claims searched:	1 to 13	**Date of search:**	19 February 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G5R (RNH, RNJ, RNK)

Int Cl (Ed.6): G11B 15/30, 15/32, 15/43, 15/50

Other: Online: WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0574270 A2	(TOSHIBA) see figure 2	1-9
X	US 5372326	(KIM) see figure 5	1-9,12,13
X	US 5292086	(MIN) see figure 1	1, 6-9, 12
X	US 4494712	(GODWIN et al) see 68, 88, figure 6	1,6-11
X	US 3888432	(KATOH) see figure 4	1-9

18

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.